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Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

1. (original) A method for fabricating an optical switch which switches an optical signal from an input port into any one of N output ports, the method comprising the steps of:

providing a substrate;

creating first and second movable platforms by a semiconductor process on the substrate, where the first and second movable platforms move relative to the substrate;

creating a stationary platform on the substrate by a semiconductor process;

forming first and second light guiding structures on the first movable platform;

forming third and fourth light guiding structures on the second movable platform;

forming a fifth light guiding structure on the stationary platform;

wherein the position of the first movable platform determines whether the optical signal propagates through the first or second light guiding structures and the position of the second movable platform determines whether the optical signal propagates through the third or fourth light guiding structures, thereby creating an optical path from the input port to one of the N output ports.

2. (original) The method of claim 1 wherein the first and second movable platforms have a single degree of movement freedom relative to the substrate.

3. (original) The method of claim 2 wherein the first and second movable platforms are adapted to move in a linear direction.

4. (original) The method of claim 2 wherein the first and second movable platforms are adapted to rotate.

5. (original) The method of claim 1 further comprising the step of creating a cavity in the substrate so that the first and second movable platforms are suspended at a distance from the substrate.

6. (original) The method of claim 5 further comprising the step of creating a spring support structure where one end of the spring support structure is mounted to the substrate and the other end of the spring support structure is coupled to the first movable platform, the spring support structure permitting the first movable platform to move relative to the substrate.

7. (original) The method of claim 1 wherein the first light guiding structure includes a waveguide.

8. (original) The method of claim 7 wherein the third light guiding structure includes a waveguide.

9. (original) The method of claim 7 wherein the fifth light guiding structure includes a waveguide.

10. (original) The method of claim 8 wherein the fifth light guiding structure includes a waveguide.

11. (original) The method of claim 1 wherein if the positions of the first movable platform, the second movable platform and the stationary platform are changed relative to one another, the optical signal propagates along a different optical path from the input port to a different one of the N output ports.

12. (original) The method of claim 11 wherein the optical path and the different optical path do not cross.

13. (original) The method of claim 12 wherein none of the N optical paths cross one another.

14. (original) The method of claim 1 wherein the step of forming a first light guiding structure creates a first light guiding structure having a large radius of curvature which gradually changes the direction of the optical signal.

15. (original) The method of claim 14 wherein the step of forming a third light guiding structure creates a third light guiding structure having a large radius of curvature which gradually changes the direction of the optical signal.

16. (original) The method of claim 15 wherein the step of forming a fifth light guiding structure creates a fifth light guiding structure having a large radius of curvature which gradually changes the direction of the optical signal.

17. (original) The method of claim 1 wherein the steps of forming the first, second, third and fourth light guiding structures include depositing the first, second, third and fourth light guiding structures onto the first and second movable platforms.

18. (original) The method of claim 1 wherein the fifth light guiding structure on the first stationary platform is positioned to receive the optical signal from the input port and propagates the optical signal to the first light guiding structure on the first movable platform, the first light guiding structure propagating the optical signal to the second light guiding structure on the second movable platform.

19. (original) The method of claim 18 further comprising the step of forming a sixth light guiding structure on a second stationary platform, where the second light

guiding structure on the second movable platform propagates the optical signal to the sixth light guiding structure.

20. (original) The method of claim 1 further comprising the step of forming a sixth light guiding structure on the stationary platform, where the position of the second movable platform determines whether the optical signal propagates to the fifth or sixth light guiding structures.

21. (original) The method of claim 1 wherein the first, second, third, fourth and fifth light guiding structures do not cross one another.

22. (original) The method of claim 1 further comprising the step of forming an activation electrode coupled to the first movable platform, the actuator including an actuation electrode positioned to interact electrostatically with the activation electrode.

23. (original) The method of claim 22 wherein the actuation electrode and activation electrode are inter-digitized.

24. (original) The method of claim 1 further comprising the step of forming a sensing electrode for determining the position of the first movable platform.

25. (original) The method of claim 4 wherein the first light guiding structure includes a waveguide.

26. (original) The method of claim 25 wherein the third light guiding structure includes a waveguide.

27. (original) The method of claim 25 wherein the fifth light guiding structure includes a waveguide.

28. (original) The method of claim 26 wherein the fifth light guiding structure includes a waveguide.

29. (original) The method of claim 4 wherein if the positions of the first movable platform, the second movable platform and the stationary platform are changed relative to one another, the optical signal propagates along a different optical path from the input port to a different one of the N output ports.

30. (original) The method of claim 29 wherein the optical path and the different optical path do not cross.

31. (original) The method of claim 30 wherein none of the N optical paths cross one another.

32. (original) The method of claim 4 wherein the step of forming a first light guiding structure creates a first light guiding structure having a large radius of curvature which gradually changes the direction of the optical signal.

33. (original) The method of claim 32 wherein the step of forming a third light guiding structure creates a third light guiding structure having a large radius of curvature which gradually changes the direction of the optical signal.

34. (original) The method of claim 33 wherein the step of forming a fifth light guiding structure creates a fifth light guiding structure having a large radius of curvature which gradually changes the direction of the optical signal.

35. (original) The method of claim 4 wherein the fifth light guiding structure on the first stationary platform is positioned to receive the optical signal from the input port and propagates the optical signal to the first light guiding structure on the first movable platform, the first light guiding structure propagating the optical signal to the second light

guiding structure on the second movable platform.

36. (original) The method of claim 35 further comprising the step of forming a sixth light guiding structure on a second stationary platform, where the second light guiding structure on the second movable platform propagates the optical signal to the sixth light guiding structure.

37. (original) The method of claim 4 further comprising the step of forming a sixth light guiding structure on the stationary platform, where the position of the second movable platform determines whether the optical signal propagates to the fifth or sixth light guiding structures.

38. (original) The method of claim 4 wherein the first, second, third, fourth and fifth light guiding structures do not cross one another.

39. (original) The method of claim 4 further comprising the step of forming an activation electrode coupled to the first movable platform, the actuator including an actuation electrode positioned to interact electrostatically with the activation electrode.

40. (original) The method of claim 4 further comprising the step of forming a sensing electrode for determining the position of the first movable platform.

41. (original) A device for switching an optical signal from an input port into any one of N output ports, the device comprising:

a substrate;

first and second movable platforms formed by a semiconductor process on the substrate, where the first and second movable platforms move relative to the substrate;

a stationary platform formed by a semiconductor process on the substrate;

first and second light guiding structures formed on the first movable

platform;

third and fourth light guiding structures formed on the second movable platform;

a fifth light guiding structure formed on the stationary platform;

wherein the position of the first movable platform determines whether the optical signal propagates through the first or second light guiding structures and the position of the second movable platform determines whether the optical signal propagates through the third or fourth light guiding structures, thereby creating an optical path from the input port to one of the N output ports.

42. (original) The device of claim 41 wherein the first and second movable platforms have a single degree of movement freedom relative to the substrate.

43. (original) The device of claim 41 wherein the first and second movable platforms are adapted to move in a linear direction.

44. (original) The device of claim 41 wherein the first and second movable platforms are adapted to rotate.

45. (original) The device of claim 41 further comprising a cavity in the substrate where the first and second movable platforms are suspended at a distance from the cavity of the substrate.

46. (original) The device of claim 45 further comprising a spring support structure where one end of the spring support structure is mounted to the substrate and the other end of the spring support structure is coupled to the first movable platform, the spring support structure permitting the first movable platform to move relative to the substrate.

47. (original) The device of claim 41 wherein the first light guiding structure includes a waveguide.

48. (original) The device of claim 47 wherein the third light guiding structure includes a waveguide.

49. (original) The device of claim 47 wherein the fifth light guiding structure includes a waveguide.

50. (original) The device of claim 48 wherein the fifth light guiding structure includes a waveguide.

51. (original) The device of claim 41 wherein if the positions of the first movable platform, the second movable platform and the stationary platform are changed relative to one another, the optical signal propagates along a different optical path from the input port to a different one of the N output ports.

52. (original) The device of claim 51 wherein the optical path and the different optical path do not cross.

53. (original) The device of claim 52 wherein none of the N optical paths cross one another.

54. (original) The device of claim 41 wherein the first light guiding structure has a large radius of curvature which gradually changes the direction of the optical signal.

55. (original) The device of claim 54 wherein the third light guiding structure has a large radius of curvature which gradually changes the direction of the optical signal.

56. (original) The device of claim 55 wherein the fifth light guiding structure has a large radius of curvature which gradually changes the direction of the optical signal.

57. (original) The device of claim 41 wherein the fifth light guiding structure on the first stationary platform is positioned to receive the optical signal from the input port and propagates the optical signal to the first light guiding structure on the first movable platform, the first light guiding structure propagating the optical signal to the second light guiding structure on the second movable platform.

58. (original) The device of claim 57 further comprising a sixth light guiding structure formed on a second stationary platform, the second light guiding structure on the second movable platform propagating the optical signal to the sixth light guiding structure.

59. (original) The device of claim 41 further comprising a sixth light guiding structure on the stationary platform, where the position of the second movable platform determines whether the optical signal propagates to the fifth or sixth light guiding structures.

60. (original) The device of claim 41 wherein the first, second, third, fourth and fifth light guiding structures do not cross one another.

61. (original) The device of claim 41 further comprising an activation electrode coupled to the first movable platform, the actuator including an actuation electrode positioned to interact electrostatically with the activation electrode.

62. (original) The device of claim 61 wherein the actuation electrode and activation electrode are inter-digitized.

63. (original) The device of claim 41 further comprising a sensing electrode for determining the position of the first movable platform.

64. (original) The device of claim 41 wherein the first light guiding structure is coupled to the third or fourth light guiding structures by an air gap.

65. (original) The device of claim 41 wherein the first movable platform has a sixth light guiding structure, the first movable platform moving between a first position, a second position and a third position, where the optical signal propagates through the first light guiding structure when the first movable platform is in the first position, the optical signal propagates through the second light guiding structure when the first movable platform is in the second position, and the optical signal propagates through the sixth light guiding structure when the first movable platform is in the third position.

66. (original) The device of claim 65 wherein the second movable platform has a seventh light guiding structure, the second movable platform moving between a first position, a second position and a third position, where the optical signal propagates through the third light guiding structure when the second movable platform is in the first position, the optical signal propagates through the fourth light guiding structure when the second movable platform is in the second position, and the optical signal propagates through the seventh light guiding structure when the second movable platform is in the third position.

67. (original) The device of claim 41 wherein the first and second platforms are arcs, where the radius of the second platform is greater than the radius of the first platform.

68. (original) A device for switching an optical signal from any one of N input ports to an output port, the device comprising:

a substrate;

first and second movable platforms formed by a semiconductor process on the substrate, where the first and second movable platforms move relative to the substrate;

a stationary platform formed by a semiconductor process on the substrate;

first and second light guiding structures formed on the first movable platform;

third and fourth light guiding structures formed on the second movable platform;

a fifth light guiding structure formed on the stationary platform;

wherein the position of the first movable platform determines whether the optical signal propagates through the first or second light guiding structures and the position of the second movable platform determines whether the optical signal propagates through the third or fourth light guiding structures, thereby creating an optical path from one of the N input ports to the output port.

69. (original) The device of claim 68 wherein the first and second movable platforms have a single degree of movement freedom relative to the substrate.

70. (original) The device of claim 69 wherein the first and second movable platforms are adapted to move in a linear direction.

71. (original) The device of claim 69 wherein the first and second movable platforms are adapted to rotate.

72. (original) A device for switching an optical signal from an input port to one of N output ports, the device comprising:

a substrate;

first, second and Nth movable platforms formed by a semiconductor process on the substrate, where the first, second and Nth movable platforms move

relative to the substrate;

a first light guiding structure located on the first movable platform;

a second light guiding structure located on the second movable platform;

an Nth light guiding structure located on the Nth movable platform;

wherein the positions of the first, second and Nth movable platforms determine which one of the N possible optical paths is connected between the input port and one of the N output ports, the N possible optical paths being configured so that each of the N optical paths does not cross any of the other N optical paths.

73. (original) The device of claim 72 wherein the first, second and Nth movable platforms have a single degree of movement freedom relative to the substrate.

74. (original) The device of claim 72 wherein the first, second and Nth movable platforms are adapted to move in a linear direction.

75. (original) The device of claim 72 wherein the first, second and Nth movable platforms are adapted to rotate.

76. (original) The device of claim 72 wherein the first light guiding structure has a large radius of curvature which gradually changes the direction of the optical signal.

77. (original) The device of claim 76 wherein the second light guiding structure has a large radius of curvature which gradually changes the direction of the optical signal.

78. (original) The device of claim 77 wherein the Nth light guiding structure has a large radius of curvature which gradually changes the direction of the optical signal.

79. (withdrawn) A method of fabricating an optical switching device, the method comprising the steps of:

providing a silicon-on-insulator wafer including a substrate, a dielectric layer and a silicon device layer;

patterning an optical guiding component on the silicon device layer;

patterning the silicon device layer to produce a movable element integral with the silicon device layer, the movable element carrying the optical guiding component; and

freeing at least a portion of the movable element from the substrate by removing the dielectric layer and the substrate underneath the movable element.

80. (withdrawn) The method of claim 79 wherein the optical guiding component is a waveguide.

81. (withdrawn) The method of claim 79 wherein the optical guiding component is a mirror.

82. (withdrawn) The method of claim 79 wherein the optical guiding component is a lens.

83. (original) A device for switching an optical signal from an input port into any one of N output ports, the device comprising:

a substrate;

first and second movable platforms formed by a semiconductor process on the substrate, where the first and second movable platforms move relative to the substrate;

a stationary platform formed by a semiconductor process on the substrate;

first and second mirrorless light guiding structures formed on the first movable platform;

third and fourth mirrorless light guiding structures formed on the second

movable platform;

a fifth light guiding structure formed on the stationary platform;

wherein the position of the first movable platform determines whether the optical signal propagates through the first or second mirrorless light guiding structures and the position of the second movable platform determines whether the optical signal propagates through the third or fourth mirrorless light guiding structures, thereby creating an optical path from the input port to one of the N output ports.

84. (original) The device of claim 83 wherein the first and second movable platforms have a single degree of movement freedom relative to the substrate.

85. (original) The device of claim 83 wherein the first and second movable platforms are adapted to move in a linear direction.

86. (original) The device of claim 83 wherein the first and second movable platforms are adapted to rotate.

87. (original) The device of claim 83 further comprising a cavity in the substrate where the first and second movable platforms are suspended at a distance from the cavity of the substrate.

88. (original) The device of claim 87 further comprising a spring support structure where one end of the spring support structure is mounted to the substrate and the other end of the spring support structure is coupled to the first movable platform, the spring support structure permitting the first movable platform to move relative to the substrate.

89. (original) The device of claim 83 wherein the first mirrorless light guiding structure is a waveguide.

90. (original) The device of claim 89 wherein the third mirrorless light guiding structure is a waveguide.

91. (original) The device of claim 89 wherein the fifth light guiding structure is a waveguide.

92. (original) The device of claim 90 wherein the fifth light guiding structure is a waveguide.

93. (original) The device of claim 83 wherein if the positions of the first movable platform, the second movable platform and the stationary platform are changed relative to one another, the optical signal propagates along a different optical path from the input port to a different one of the N output ports.

94. (original) The device of claim 91 wherein the optical path and the different optical path do not cross.

95. (original) The device of claim 94 wherein none of the N optical paths cross one another.

96. (original) The device of claim 83 wherein the first mirrorless light guiding structure has a large radius of curvature which gradually changes the direction of the optical signal.

97. (original) The device of claim 96 wherein the third mirrorless light guiding structure has a large radius of curvature which gradually changes the direction of the optical signal.

98. (original) The device of claim 97 wherein the fifth light guiding structure has a large radius of curvature which gradually changes the direction of the optical

signal.

99. (original) The device of claim 83 wherein the fifth light guiding structure on the first stationary platform is positioned to receive the optical signal from the input port and propagates the optical signal to the first mirrorless light guiding structure on the first movable platform, the first mirrorless light guiding structure propagating the optical signal to the second mirrorless light guiding structure on the second movable platform.

100. (original) The device of claim 99 further comprising a sixth light guiding structure formed on a second stationary platform, the second mirrorless light guiding structure on the second movable platform propagating the optical signal to the sixth light guiding structure.

101. (original) The device of claim 83 further comprising a sixth light guiding structure on the stationary platform, where the position of the second movable platform determines whether the optical signal propagates to the fifth or sixth light guiding structures.

102. (original) The device of claim 83 wherein the first, second, third, fourth and fifth light guiding structures do not cross one another.

103. (original) The device of claim 83 further comprising an activation electrode coupled to the first movable platform, the actuator including an actuation electrode positioned to interact electrostatically with the activation electrode.

104. (original) The device of claim 103 wherein the actuation electrode and activation electrode are inter-digitized.

105. (original) The device of claim 83 further comprising a sensing electrode for determining the position of the first movable platform.

106. (original) The device of claim 83 wherein the first mirrorless light guiding structure is coupled to the third or fourth mirrorless light guiding structures by an air gap.

107. (original) The device of claim 83 wherein the first movable platform has a sixth light guiding structure, the first movable platform moving between a first position, a second position and a third position, where the optical signal propagates through the first mirrorless light guiding structure when the first movable platform is in the first position, the optical signal propagates through the second mirrorless light guiding structure when the first movable platform is in the second position, and the optical signal propagates through the sixth light guiding structure when the first movable platform is in the third position.

108. (original) The device of claim 107 wherein the second movable platform has a seventh light guiding structure, the second movable platform moving between a first position, a second position and a third position, where the optical signal propagates through the third mirrorless light guiding structure when the second movable platform is in the first position, the optical signal propagates through the fourth mirrorless light guiding structure when the second movable platform is in the second position, and the optical signal propagates through the seventh light guiding structure when the second movable platform is in the third position.

109. (original) The device of claim 83 wherein the first and second platforms are arcs, where the radius of the second platform is greater than the radius of the first platform.